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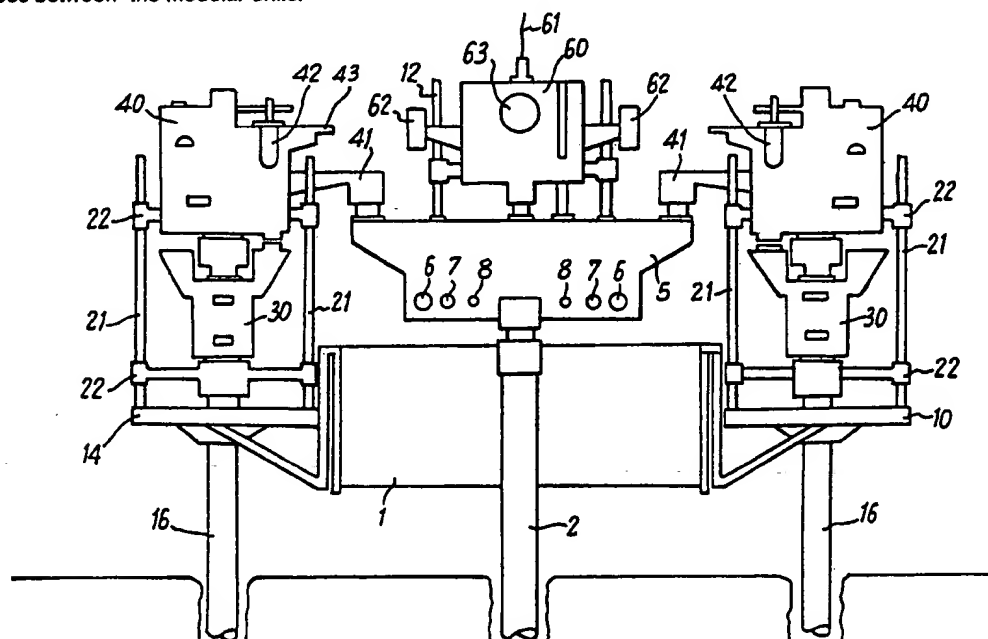
**Selected US specifications from IPC sub-class**

**E21B**

(54) **Modular submarine station on a monopod frame**

(57) A submarine oil producing station comprises a platform 1 of octagonal shape carried by a central column 2 anchored in the ground on which is fixed an effluent collecting module 5. Stacked on the said module is a central control module 60. Fixed in overhanging fashion on six sides of the octagon are frames 10 to 15 adapted to overhang drilling wells and each carrying a production head 30, 40. On the other two sides of the octagon, fixed by means of frames, there are an umbilical head and a connecting module for the discharge of effluent.

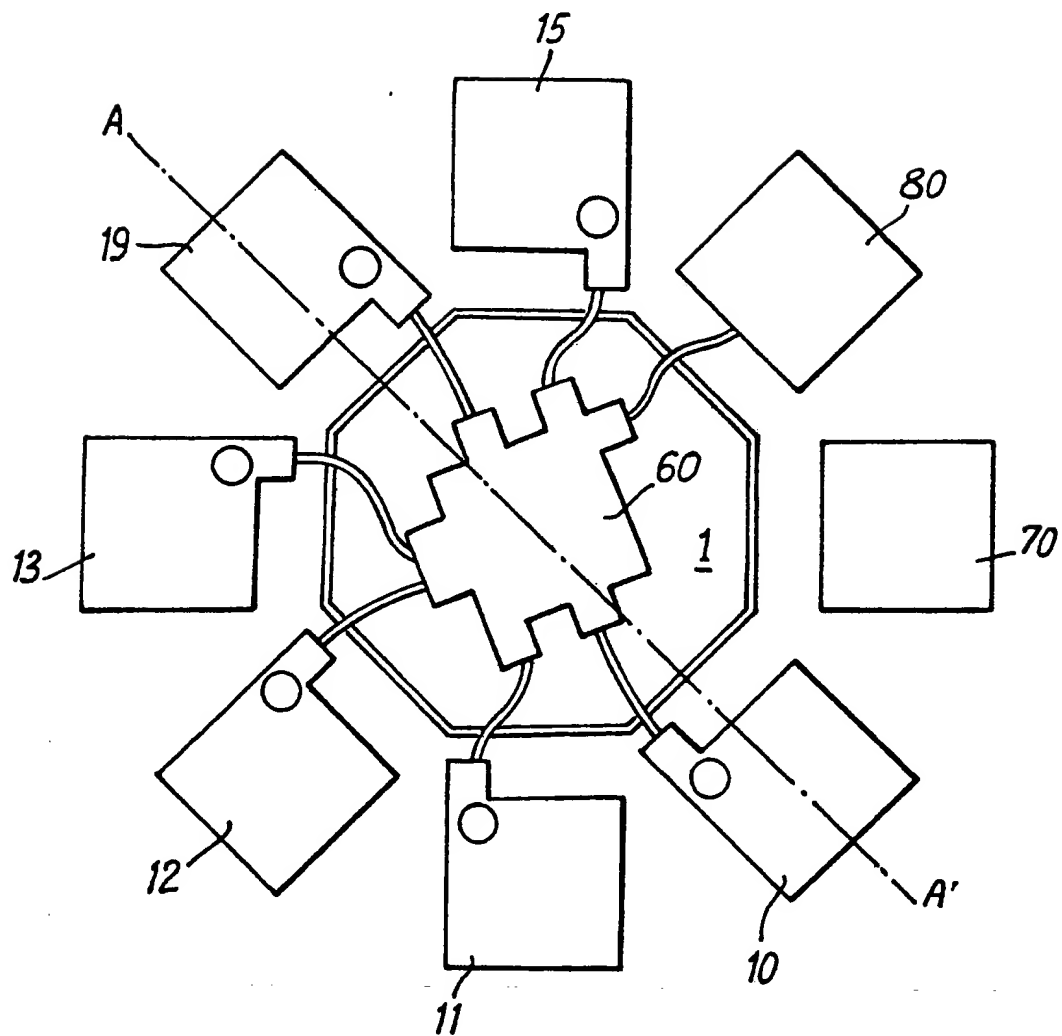
This arrangement makes it possible to bring a certain number of wells close to the platform and so shorten the distances between the modular units.

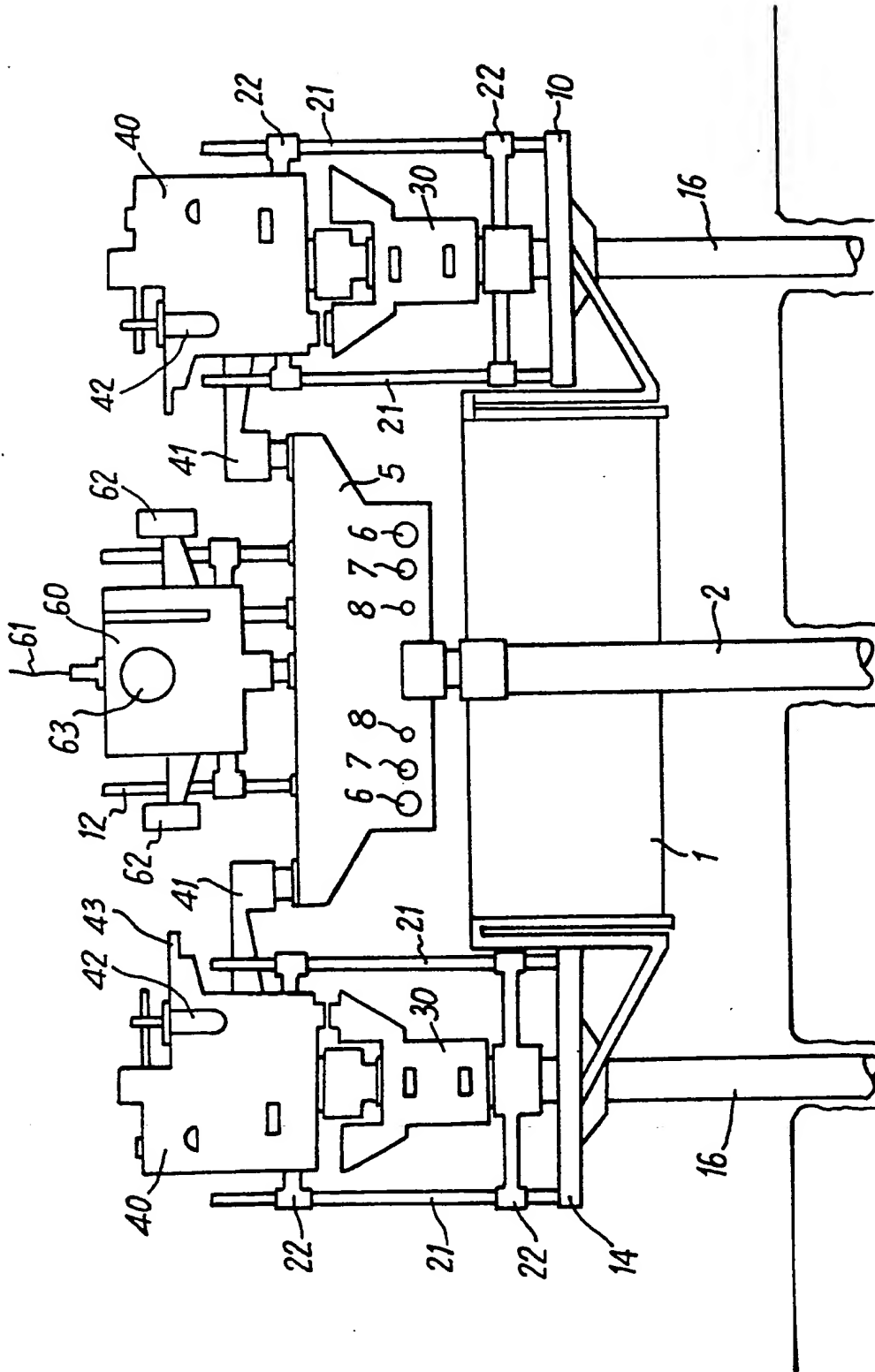


The drawing(s) originally filed was (were) informal and the print here reproduced is taken from a later filed formal copy.

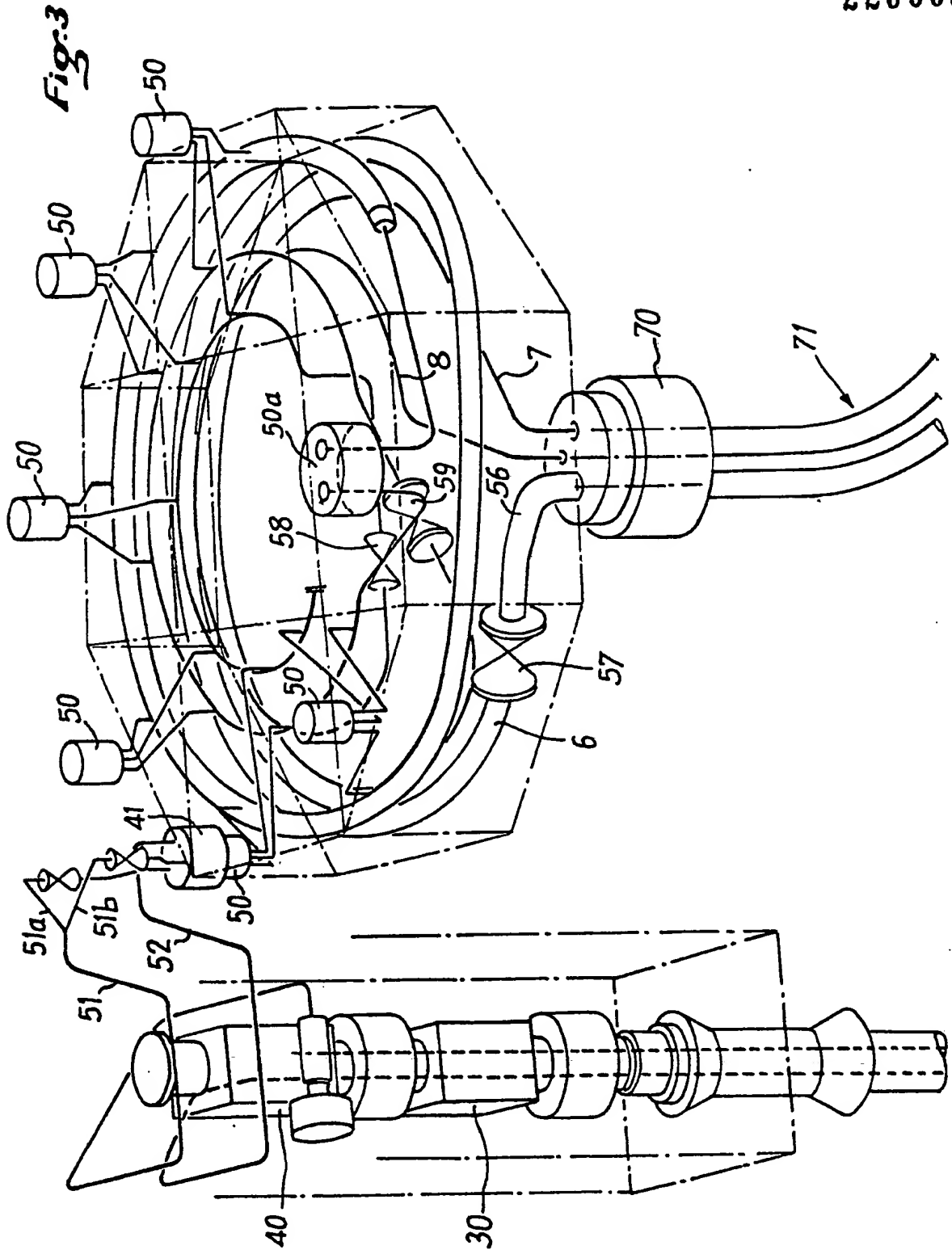
This print takes account of replacement documents submitted after the date of filing to enable the application to comply with the formal requirements of the Patents Rules 1982.

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*Fig. 1*



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Modular submarine station on a monopod frame

The present invention relates to oil producing installations housed in sub-marine stations at considerable depths.

Such stations can be set in place, maintained and monitored without direct intervention, by means of automatic monitoring systems. French Patents Nos. 2371552 and 2555249 in the name of the Applicants describe such sub-marine stations which comprise a rectangular base frame which forms a rigid jig placed on the sea bottom and provided with a plurality of sites adapted to receive modular assemblies. The said sites receive such modular assemblies through a guide base which has four guide columns. One of them may consist of a well head gear consisting of a safety lock above which there is a production unit carrying automatic and remote control equipment housed in the form of containers in housings provided on the upper face of the casing covering the said production unit.

Such a double module thus comprises two modules stacked by means of guide columns.

According to Patent No. 2555249, in a peripheral zone adjacent the two opposite sides of the rectangular frame, there are sites for such well head equipment sets, while a central area of the frame constitutes a site adapted to receive stacked modular units such as a connecting unit and a peripheral monitoring unit, while there is in the centre a site for a central station control unit.

Each modular unit is provided with guide means, the geometry of which corresponds to that of the guide means disposed either on the guide bases fixed to the frame or on subjacent modules. Such installations do have drawbacks. The pipework for collecting effluent from the well head and starting from the well head must first of all be connected to the connection module and then negotiate considerable distances before ending at the discharge lines. Similarly, automatic electrohydraulic connection of the connection module to the multiconnector receptacles of the well head production unit is not easy when the distance between the said module and the well head increases..

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Indeed, an installation disposed on a rectangular frame will accept only a limited number of well heads by virtue of the distance separating these heads from the connection modules and peripheral monitoring modules, and also the central monitoring module.

What is more, as the sea bottom has considerable differences in level, it is very difficult to achieve a flat positioning on such a sea bottom of a frame which is of substantial diameter.

The object of the present invention is to offset these disadvantages. It proposes an oil producing modular sub-marine station on a monopod framework comprising a platform of octagonal shape carried by a central column anchored to the ground and on which there is an effluent collecting module, on which a central control module is stacked by guide columns, while on at least one of six sides of the octagonal platform there is an overhanging frame designed to overhang a drilling well and carrying a production head comprising a security unit on which the production unit is stacked by means of guide columns, the other two sides of the octagonal platform carrying, fixed on frames, an umbilical head or processing centre at which terminate the surface conduits and cables for electrohydraulic control and a connecting module for the evacuation or injection of effluent.

Other particular features of the invention will become evident from the description of an embodiment illustrated by the accompanying drawings, in which:

- Fig. 1 diagrammatically shows a plan view of the installation;
- Fig. 2 shows a side view in a section taken on the line A-A' in Fig. 1, and
- Fig. 3 shows the collection module and its network in a perspective view.

The octagonal platform 1 is carried by a central column 2 which is fixed in the sea bottom. Its six sides carry frames 10 to 15 on which rest six production heads.

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Each production head consists of a bottom part or safety block 30 and an upper part or production block or unit 40. The production unit contains the sensitive components such as sensors, nozzles, process and safety valves as well as the remote control means associated with the production head. Should one of the components fail, the production unit is raised and replaced by an identical unit. During this operation, carried out without the help of a diver, closure of the bottom unit helps to ensure the safety of the well. Each frame 10 to 15 carries four guide columns 21 on which there are mounted, over the drilling well 16, by means of guide sleeves 22, the safety unit 30 and the production unit 40, rigid with these sleeves.

Each production unit carries an oil connection connector 41. Each well head is monitored by an electrohydraulic assembly 42 integrated into the unit.

Above the platform 1 there is anchored to the central column 2 a collecting module 5. Locked onto the base platform this module provides for transfer of fluids between the six wells and the connecting network, and in particular it comprises production effluent outlets at 6, individual well test fluids at 7 and service lines, for example a lift gas annular assembly at 8.

The effluent collector is shown in detail in Fig. 3.

The module 5 which is of octagonal shape consists of welded tubes for protecting the conduits which it encloses. It is provided with six male multi-passage connectors 50 corresponding to the six well heads 30, 40. Each production unit 40 is linked by a production line 51 which, by means of two branches, one 51a and the other 51b, for individual test purposes, terminates like the service line 52 in a female connector 41 which fits over the male connector 50.

Three lines of collectors emerge from each connector 50, the lines emanating from each connector relative to a well being connected into three grouped lines: test line 7, service line 8, for example for a gas lift, and a production line 6. All

the lines are fitted with valves 58, 59 and in particular the production line 6 which is fitted with an isolating valve 57 capable of being actuated by a remote controlled vehicle. It makes it possible to isolate the station from the flow lines in order to avoid discharging oil into the sea when a production unit is closed down.

After having completed a number of loops inside the octagon to ensure greater flexibility of handling, the three lines 6, 7 and 8 terminate in a connection module 70 for connecting three ducts to the flow line system 71.

A multipassage connector 50a makes it possible to raise a remote controlled valve situated downstream of the production and test circuit. This valve isolates the two circuits in normal operation and makes it possible to link them if required.

The module 5 carries on its upper surface guide columns 12 which serve to locate the central control unit 60. It serves to receive coded messages sent to it from the surface processing centre through a microprocessor 63 and a coaxial connecting cable 61. The hydraulic power is likewise supplied to it from the processing centre by an umbilical link. The series of umbilical links connected to the processing centre passes through a module 60 fixed to one of the frames moored to the sides of the octagonal platform 1.

The connections between this module and the central control unit 60 are made by a telemanipulator or robot.

The electrohydraulic links between the central unit 60 and the production units 40 are made by fitting the male multiconnectors 62 carried by the unit 60 into corresponding receptacles 43 in production units, using autonomous manipulators as described in French Patent No. 2555248 in the name of the Applicants.

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PATENT CLAIMS

1. Modular oil producing sub-marine station on a monopod frame, characterised in that it comprises a platform (1) of octagonal shape carried by a central column (2) anchored in the ground, on which there is fixed an effluent collecting module (5), on which module there is stacked by means of guide columns a central control module (60) while on at least one of six sides of the octagonal platform there is an overhanging frame (10 to 15) designed to overhang a drilling well and carrying a production head comprising a safety unit (30) on which a production unit (40) is stacked by means of guide columns, there being fixed to the other two sides of the octagonal platform, by means of frames, an umbilical head (80) at which terminate the conduits and surface cables for controlling and transmitting electrical and hydraulic power and a connecting module (70) for the discharge of effluent.
2. A station according to Claim 1, characterised in that the control of each well head is ensured by an electrohydraulic assembly (42) integrated into the production unit.
3. A station according to Claim 1 or 2, characterised in that the central control module (60) houses a central electrohydraulic assembly (63) for distributing the electrical and hydraulic power and the signals, the said signals comprising coded messages processed by a microprocessor housed in this unit.
4. A station according to Claim 1, characterised in that the collecting module (5) which is of octagonal shape and which is formed by welded protective tubes comprises connections to production units of each well and three production lines (6), test lines (7) and service lines (8), the said lines forming a plurality of flexibility loops inside the module before terminating at the module (70) which provides for connection to the flow lines.
5. A modular oil producing sub-marine station on a monopod frame substantially as described herein with reference to the accompanying drawings.